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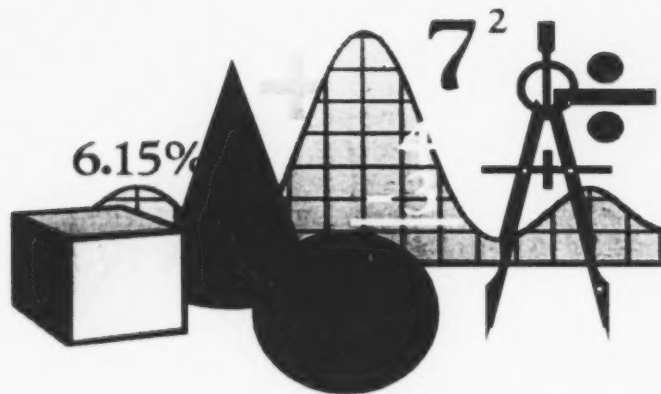
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## ABSTRACT

This companion document to the instructor's guide for a course designed to prepare employees for statistical process control (SPC) training given at their workplace by refreshing math skills and building the concepts and vocabulary necessary to understand SPC in manufacturing environments. SPC-Prep 1 addresses the math skills necessary to perform SPC calculations. The manual provides materials on these topics: math memories; keeping track of learning; math operations; place value; rounding off numbers; finding an average; decimals; and positive and negative numbers. Information sheets and exercise sheets are provided. A word list and answer key for the exercises are provided. (YLB)

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# WORKPLACE EDUCATION



## SPC-Prep 1

### Participant's Manual

Nancy Ruetz

### Project ALERT



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## Introduction to SPC-Prep 1

Everyone uses numbers every day for many reasons. At home, at school, and on the job, numbers are part of our life. Think of the ways you have used numbers in the last week. Shopping, paying bills, and balancing your checking account are common activities that involve math.

Think of the times you have had to add, subtract, multiply, or divide numbers. Addition, subtraction, multiplication, and division are called *math operations* or *basic operations* in math. They are the foundation of all math.

The old saying, *If you don't use it, you lose it*, applies to math. This course will give you a chance to review, refresh, and maybe even learn some new math skills.

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### The goals of SPC-Prep 1 are:

- To demonstrate mastery of addition, subtraction, multiplication, and division of whole numbers, fractions, and decimals.
- To demonstrate mastery of place value in regard to decimals.
- To demonstrate mastery of addition and subtraction of positive and negative numbers.
- To calculate an average from a sum of positive and negative numbers.

## Using the Participant's Manual

Your instructor will decide on lessons based on the experience and needs of you and your class. You may not do the lessons in the order they are presented in this manual. The instructor may also use exercises based on your specific job or company that do not appear in this book.

There are many reasons why employees have trouble understanding math. Many people have painful memories about class room experiences that happened long ago. This course is designed to help you learn in a safe atmosphere. Your life experiences will help you understand many concepts that were difficult for you before. Lessons are linked to common experiences. This will make learning more practical and easier to apply to life situations.

The *SPC-Prep Daily Report* helps the instructor understand if learning is going as planned. It gives you the opportunity to give important feedback to the instructor. Sometimes it is difficult to speak up in a class when something is not clear. This form gives you a chance to tell the instructor exactly what you need so you can understand the lessons.

It is helpful to write down what you have learned when you learn it. You can better understand how you learn. The more involved you are with the learning process, the easier learning will be. You will be asked to fill out the *SPC-Prep Daily Report* after each lesson.

## SPC-Prep Daily Report

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Time \_\_\_\_\_

Today's topic \_\_\_\_\_

What I learned today:

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Why do I need to know this? or How did I learn this?

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What I need more practice with: \_\_\_\_\_

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What would be helpful for me to learn: \_\_\_\_\_

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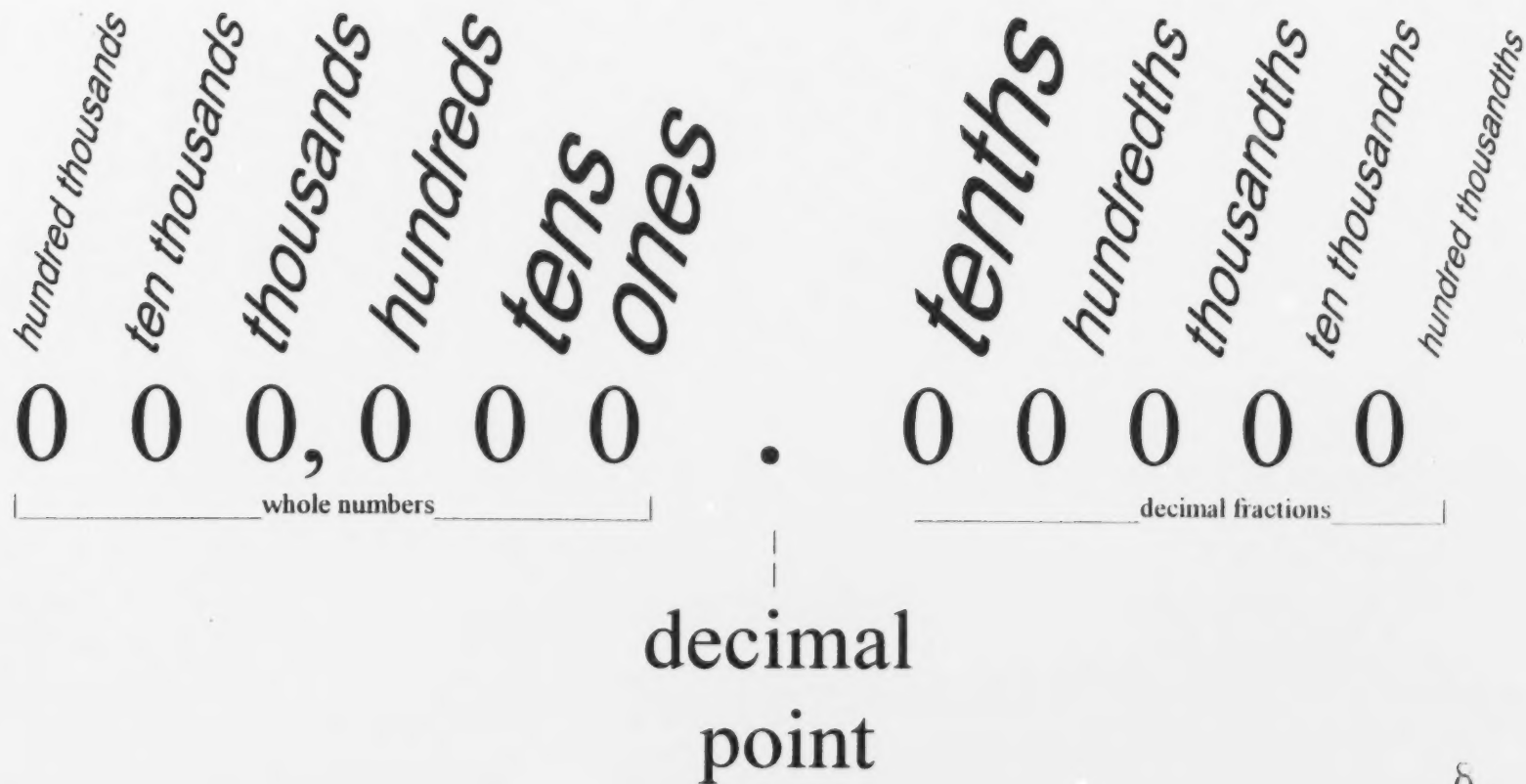
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I am ready to move on to the next topic. ☐ Yes ☐ No

# Place Value



## Whole number Practice

Add the following:

$$\begin{array}{r} 1. \quad 74 \\ 23 \\ 80 \\ + \quad \underline{22} \end{array}$$

$$\begin{array}{r} 2. \quad 14 \\ 82 \\ 51 \\ + \quad \underline{46} \end{array}$$

$$\begin{array}{r} 3. \quad 98 \\ 19 \\ 97 \\ + \quad \underline{73} \end{array}$$

$$\begin{array}{r} 4. \quad 98 \\ 35 \\ 49 \\ 8 \\ + \quad \underline{93} \end{array}$$

$$\begin{array}{r} 5. \quad 38 \\ 95 \\ 56 \\ + \quad \underline{97} \end{array}$$

$$\begin{array}{r} 6. \quad 383 \\ 558 \\ 214 \\ + \quad \underline{635} \end{array}$$

$$\begin{array}{r} 7. \quad 685 \\ 378 \\ 298 \\ + \quad \underline{419} \end{array}$$

$$\begin{array}{r} 8. \quad 496 \\ 545 \\ 339 \\ + \quad \underline{108} \end{array}$$

$$\begin{array}{r} 9. \quad 332 \\ 479 \\ 283 \\ + \quad \underline{476} \end{array}$$

$$\begin{array}{r} 10. \quad 8613 \\ 8000 \\ 9678 \\ 3159 \\ + \quad \underline{2718} \end{array}$$

$$\begin{array}{r} 11. \quad 41263 \\ 87190 \\ 36850 \\ 23367 \\ + \quad \underline{70201} \end{array}$$

# Subtract

$$\begin{array}{r} 1. \quad 71 \\ - 38 \\ \hline \end{array}$$

$$\begin{array}{r} 2. \quad 807 \\ - 216 \\ \hline \end{array}$$

$$\begin{array}{r} 3. \quad 4930 \\ - 1038 \\ \hline \end{array}$$

$$\begin{array}{r} 4. \quad 5671 \\ - 1084 \\ \hline \end{array}$$

$$\begin{array}{r} 5. \quad 67592 \\ - 48111 \\ \hline \end{array}$$

$$\begin{array}{r} 6. \quad 65758 \\ - 26946 \\ \hline \end{array}$$

$$\begin{array}{r} 7. \quad 54629 \\ - 20099 \\ \hline \end{array}$$

$$\begin{array}{r} 8. \quad 61287 \\ - 20698 \\ \hline \end{array}$$

$$\begin{array}{r} 9. \quad 21248 \\ - 11447 \\ \hline \end{array}$$

## Multiply

$$\begin{array}{r} 1. \quad 16 \\ \times 20 \\ \hline \end{array}$$

$$\begin{array}{r} 2. \quad 36 \\ \times 77 \\ \hline \end{array}$$

$$\begin{array}{r} 3. \quad 89 \\ \times 99 \\ \hline \end{array}$$

$$\begin{array}{r} 4. \quad 289 \\ \times 998 \\ \hline \end{array}$$

$$\begin{array}{r} 5. \quad 8736 \\ \times 605 \\ \hline \end{array}$$

$$\begin{array}{r} 6. \quad 2671 \\ \times 803 \\ \hline \end{array}$$

$$\begin{array}{r} 7. \quad 2000 \\ \times 701 \\ \hline \end{array}$$

$$\begin{array}{r} 8. \quad 9503 \\ \times 431 \\ \hline \end{array}$$

$$\begin{array}{r} 9. \quad 10000 \\ \times 100 \\ \hline \end{array}$$

**Divide the following:**

1.  $36 \div 12 =$

2.  $57 \div 19 =$

3.  $720 \div 36 =$

4.  $26010 \div 45 =$

5.  $1288 \div 23 =$

6.  $70488 \div 89 =$

7.  $1248 \div 42 =$

8.  $6272 \div 24 =$

## **Rounding off numbers**

Sometimes numbers are rounded off, to make them easier to remember. Try to remember how much you paid to the IRS this year? If it's not tax time, you can probably remember approximately what you paid, but it is unlikely that you remember the figure to the penny. Numbers are often rounded off to make them easier to understand, and when accuracy is not necessary.

Auto manufacturers publish reports of the number of cars sold in a given time with rounded off numbers. If 12,624,723 cars were sold in a 6-month period, the number may be rounded off to the nearest hundred thousand -- 12,600,000.

To round whole numbers, follow these steps:

Underline the number in the place you are rounding.

12,624,723 (6 is in the hundred thousand place)

Look at the number in the next place to the right of the underlined number. 12,624,723 (2 is next to the underlined number in this example.)

If the number to the right is less than 5, leave the underlined number as it is. (2 is less than 5)

If the number to the right of the underlined number is 5 or more, add 1 to the underlined number.

Change all numbers to the right of the underlined number to zero.

## Practice Rounding Off Numbers:

1. Round to the nearest 10:

|     |     |     |
|-----|-----|-----|
| 78  | 53  | 45  |
| 32  | 985 | 817 |
| 897 | 432 | 911 |

2. Round to the nearest 100:

|       |       |        |
|-------|-------|--------|
| 3,124 | 6,598 | 62,912 |
| 8,555 | 8,499 | 45,150 |

3. Round to the nearest 1000:

|        |        |         |
|--------|--------|---------|
| 23,798 | 65,073 | 398,186 |
| 67,599 | 41,008 | 994,499 |

4. Round to the nearest 10,000:

|         |         |           |
|---------|---------|-----------|
| 123,456 | 456,987 | 1,983,129 |
| 793,108 | 497,296 | 3,928,376 |

5. Round to the nearest 100,000:

|           |             |
|-----------|-------------|
| 1,497,387 | 109,477,498 |
| 8,399,832 | 986,399,737 |
| 4,783,925 | 843,399,000 |

6. Round to the nearest 1,000,000:

|             |             |
|-------------|-------------|
| 123,995,884 | 165,376,984 |
| 974,538,883 | 170,802,840 |

## Divisible Number

Can you think of a time when there were several items to be divided among a group of children and there was some concern about how many each child would get? For example, there are five small boys in your family and you have 14 packs of baseball cards to divide between them. Can it be so everyone gets the same number of pack? Divisible numbers are an important skill to understand when working with fractions.

### Practice with Divisible Numbers

1. 32 is divisible by which number?
  - a. 5
  - b. 3
  - c. 8
  - d. None of these
2. The sum of 21 and 12 is divisible by which number?
  - a. 10
  - b. 9
  - c. 11
  - d. None of these
3. 63 is divisible by which number?
  - a. 7
  - b. 5
  - c. 8
  - d. None of these
4. The sum of 28 and 53 is divisible by which number?
  - a. 9
  - b. 8
  - c. 6
  - d. None of these
5. 120 is divisible by which number?
  - a. 7
  - b. 6
  - c. 9
  - d. None of these
6. The sum of 81 and 69 is divisible by which number?
  - a. 6
  - b. 5
  - c. 4
  - d. None of these
7. 104 is divisible by which number?
  - a. 9
  - b. 10
  - c. 8
  - d. None of these
8. The sum of 125 and 69 is divisible by which number?
  - a. 5
  - b. 2
  - c. 7
  - d. None of these

## Introduction to Fractions

A fraction is a part of something. A dime is a fraction of a dollar. It is one of ten equal parts of one dollar or  $\frac{1}{10}$  (one tenth) of a dollar. An inch is a fraction of a foot. It is one of 12 equal parts of a foot or  $\frac{1}{12}$  (one twelfth) of a foot. Saturday and Sunday are a fraction of the week. They are 2 equal parts of the week or  $\frac{2}{7}$  (two sevenths) of the week. The numbers in the fraction are called the

**numerator** -- which tells how many parts you have  
**denominator** -- which tells how many equal parts in the whole

The square is divided into two equal parts.  
Each part is  $\frac{1}{2}$ .



The circle is divided into four equal parts.  
Each part is  $\frac{1}{4}$ .

### Practice with fractions:

- \_\_\_\_\_ 1. A foot contains 12 inches. 5 inches is what fraction of a foot?
- \_\_\_\_\_ 2. 57¢ is what fraction of one dollar?
- \_\_\_\_\_ 3. A pound contains 16 ounces. 9 ounces is what fraction of a pound?
- \_\_\_\_\_ 4. 7 months is what fraction of a year?
- \_\_\_\_\_ 5. The work days, Monday through Friday, are what fraction of a week?
- \_\_\_\_\_ 6. If 72 pages of a report 298 pages have been typed, what fraction of the report is typed?

## Practice with Fractions

Divide the boxes below into the number of equal parts stated in the box.

2

4

8

16

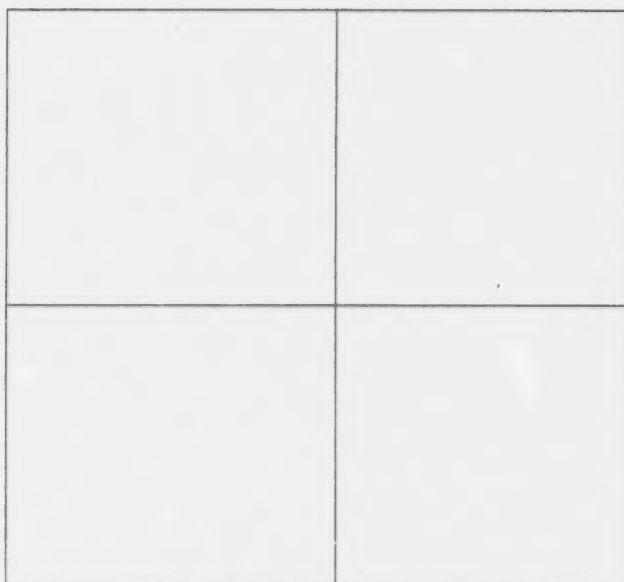
Using the boxes on the last page, answer the following questions.

1. How many fourths are there in one half? \_\_\_\_\_
2. How many eighths are there in one half? \_\_\_\_\_
3. How many sixteenths are there in one fourth? \_\_\_\_\_
4. How many sixteenths are there in three fourths? \_\_\_\_\_
5. How many sixteenths are there in one half? \_\_\_\_\_

$$\frac{1}{2} = \frac{2}{4} = \frac{4}{8} = \frac{8}{16}$$

$$\begin{array}{r} \frac{1}{4} \\ 6) \text{ add } + \\ \frac{1}{4} \end{array}$$

Shade in your answer.



**Math operations with fractions.** Add the following fractions.  
Be sure to reduce your answer to the lowest terms.

1.  $\frac{1}{2}$

+  $\frac{1}{2}$

2.  $\frac{2}{3}$

+  $\frac{1}{3}$

3.  $\frac{1}{5}$

+  $\frac{1}{5}$

4.  $\frac{1}{9}$

+  $\frac{4}{9}$

5.  $\frac{1}{8}$   
+  $\frac{3}{8}$

6.  $1\frac{1}{7}$   
+  $2\frac{1}{7}$

7.  $3\frac{1}{4}$   
+  $1\frac{1}{4}$

8.  $4\frac{1}{11}$   
+  $1\frac{2}{11}$

9.  $9\frac{6}{15}$   
+  $2\frac{3}{15}$

10.  $3\frac{1}{4}$   
+  $1\frac{1}{4}$

11.  $3\frac{3}{8}$   
+  $2\frac{1}{8}$

12.  $6\frac{1}{14}$   
+  $2\frac{1}{14}$

13.  $12\frac{7}{8}$   
+  $11\frac{5}{8}$

14.  $4\frac{4}{5}$   
+  $2\frac{3}{5}$

15.  $3\frac{1}{8}$   
+  $6\frac{7}{8}$

16.  $9\frac{1}{8}$   
 $6\frac{7}{8}$   
+  $2\frac{5}{8}$

## Lowest Common Denominator

Fractions must have the same bottom numbers (denominators) when adding or subtracting. If the fractions do not have the same bottom numbers, you must rewrite them so they do. This is called a finding *common denominator*. This means changing at least one of the fractions to higher terms. A *common denominator* is a number that can be divided *evenly* by all of the denominators in the problem.

The *lowest common denominator* is the *smallest* number that can be divided evenly by all of the denominators in the problem.

Find the *lowest common denominator* for the following fractions:

- |     |                |                |                |       |
|-----|----------------|----------------|----------------|-------|
| 1.  | $\frac{1}{2}$  |                | $\frac{1}{4}$  | _____ |
| 2.  | $\frac{1}{3}$  |                | $\frac{1}{9}$  | _____ |
| 3.  | $\frac{1}{4}$  |                | $\frac{1}{6}$  | _____ |
| 4.  | $\frac{1}{9}$  |                | $\frac{1}{6}$  | _____ |
| 5.  | $\frac{1}{5}$  |                | $\frac{1}{10}$ | _____ |
| 6.  | $\frac{1}{3}$  | $\frac{1}{4}$  | $\frac{1}{6}$  | _____ |
| 7.  | $\frac{1}{5}$  | $\frac{1}{10}$ | $\frac{1}{20}$ | _____ |
| 8.  | $\frac{1}{7}$  | $\frac{1}{9}$  | $\frac{1}{3}$  | _____ |
| 9.  | $\frac{1}{9}$  | $\frac{1}{3}$  | $\frac{1}{6}$  | _____ |
| 10. | $\frac{1}{12}$ | $\frac{1}{5}$  | $\frac{1}{3}$  | _____ |

**Add the following mixed fractions.** Reduce your answer to the lowest possible terms.

1.  $6\frac{1}{2}$   
+  $2\frac{1}{3}$

2.  $2\frac{1}{4}$   
+  $1\frac{1}{8}$

3.  $7\frac{1}{4}$   
+  $3\frac{1}{6}$

4.  $9\frac{1}{5}$   
+  $1\frac{1}{10}$

5.  $7\frac{1}{8}$   
+  $1\frac{1}{6}$

6.  $8\frac{1}{4}$   
+  $1\frac{1}{2}$

7.  $12\frac{1}{2}$   
+  $8\frac{1}{6}$

8.  $14\frac{3}{7}$   
+  $12\frac{1}{3}$

9.  $14\frac{9}{10}$   
+  $11\frac{4}{5}$

10.  $17\frac{1}{8}$   
+  $12\frac{1}{3}$

11.  $19\frac{3}{5}$   
+  $12\frac{7}{8}$

12.  $23\frac{9}{10}$   
+  $10\frac{4}{6}$

13.  $15\frac{4}{5}$   
+  $10\frac{11}{15}$

14.  $35\frac{1}{7}$   
+  $12\frac{1}{9}$

15.  $1\frac{1}{2}$   
 $2\frac{1}{6}$   
+  $1\frac{1}{3}$

16.  $11\frac{2}{7}$   
 $8\frac{1}{3}$   
+  $4\frac{1}{6}$

**Subtract these fractions.** Reduce your answer to the lowest possible terms.

1.  $3\frac{1}{4}$   
-  $1\frac{3}{4}$

2.  $4\frac{1}{6}$   
-  $1\frac{5}{6}$

3.  $2\frac{1}{9}$   
-  $1\frac{5}{9}$

4.  $6\frac{1}{7}$   
-  $4\frac{3}{7}$

5.  $12\frac{1}{9}$   
-  $6\frac{4}{9}$

6.  $13\frac{1}{14}$   
-  $12\frac{5}{14}$

7.  $12\frac{1}{25}$   
-  $11\frac{7}{25}$

8.  $14\frac{1}{7}$   
-  $10\frac{2}{7}$

9.  $7\frac{9}{16}$   
-  $2\frac{1}{3}$

10. 15  
-  $1\frac{1}{4}$

11. 36  
-  $5\frac{1}{9}$

12.  $7\frac{1}{16}$   
-  $2\frac{5}{64}$

13.  $12\frac{1}{4}$   
- 6

14. 7  
-  $2\frac{1}{4}$

15.  $7\frac{1}{4}$   
-  $5\frac{3}{8}$

**Subtract these fractions.** Reduce your answer to the lowest possible terms.

$$\begin{array}{r} 1. \quad 3\frac{2}{5} \\ - 1\frac{1}{5} \\ \hline \end{array}$$

$$\begin{array}{r} 2. \quad 4\frac{1}{2} \\ - 1\frac{1}{6} \\ \hline \end{array}$$

$$\begin{array}{r} 3. \quad 9\frac{7}{8} \\ - 2\frac{7}{8} \\ \hline \end{array}$$

$$\begin{array}{r} 4. \quad 12\frac{5}{6} \\ - 8\frac{1}{6} \\ \hline \end{array}$$

$$\begin{array}{r} 5. \quad 9\frac{4}{5} \\ - 2\frac{1}{10} \\ \hline \end{array}$$

$$\begin{array}{r} 6. \quad 11\frac{3}{4} \\ - 3\frac{1}{6} \\ \hline \end{array}$$

$$\begin{array}{r} 7. \quad 4\frac{7}{8} \\ - 1\frac{1}{3} \\ \hline \end{array}$$

$$\begin{array}{r} 8. \quad 12\frac{8}{15} \\ - 1\frac{1}{3} \\ \hline \end{array}$$

$$\begin{array}{r} 9. \quad 7\frac{2}{3} \\ - 1\frac{5}{6} \\ \hline \end{array}$$

$$\begin{array}{r} 10. \quad 12\frac{3}{5} \\ - 1\frac{7}{10} \\ \hline \end{array}$$

$$\begin{array}{r} 11. \quad 178\frac{4}{5} \\ - 51\frac{1}{3} \\ \hline \end{array}$$

$$\begin{array}{r} 12. \quad 52\frac{3}{8} \\ - 16\frac{23}{32} \\ \hline \end{array}$$

**Multiply these fractions.** Reduce your answer to the lowest possible terms.

1.  $\frac{1}{2} \times \frac{1}{2} =$

2.  $\frac{1}{4} \times \frac{1}{4} =$

3.  $\frac{4}{5} \times \frac{1}{6} =$

4.  $\frac{1}{5} \times \frac{2}{5} =$

5.  $\frac{4}{5} \times \frac{7}{10} =$

6.  $\frac{3}{8} \times \frac{2}{5} =$

7.  $\frac{4}{5} \times \frac{6}{10} =$

8.  $\frac{8}{14} \times \frac{6}{12} =$

9.  $\frac{3}{12} \times \frac{5}{20} =$

10.  $\frac{4}{15} \times \frac{6}{10} =$

**Multiply the following fractions.** Reduce your answer to the lowest common denominator.

1.  $1\frac{1}{2} \times 1\frac{1}{2} =$

2.  $1\frac{5}{7} \times 2\frac{1}{24} =$

3.  $2\frac{1}{7} \times 2\frac{4}{5} =$

4.  $5\frac{1}{3} \times 2\frac{1}{4} =$

5.  $1\frac{7}{9} \times 4\frac{1}{2} =$

6.  $4\frac{2}{5} \times 2\frac{8}{11} =$

7.  $1\frac{7}{10} \times 1\frac{11}{14} =$

8.  $2\frac{2}{9} \times 5\frac{2}{5} =$

9.  $2\frac{1}{5} \times 1\frac{13}{22} =$

10.  $1\frac{3}{16} \times 1\frac{13}{19} =$

**Divide the following fractions.** Reduce your answer to the lowest possible terms.

1.  $\frac{1}{2} \div \frac{1}{2} =$

2.  $\frac{1}{3} \div \frac{1}{3} =$

3.  $\frac{3}{4} \div \frac{2}{3} =$

4.  $\frac{3}{8} \div \frac{1}{2} =$

5.  $\frac{7}{8} \div \frac{3}{5} =$

6.  $\frac{7}{12} \div \frac{1}{3} =$

7.  $\frac{3}{4} \div \frac{4}{7} =$

8.  $\frac{5}{12} \div \frac{5}{6} =$

### Basic Operations with Mixed Fractions

1. Fred has the following lengths of  $\frac{1}{2}$ -inch copper pipe:  $8\frac{5}{16}$  inches,  $12\frac{1}{2}$  inches,  $9\frac{3}{4}$  inches, and 26 inches. If he welds together the three shortest lengths, what will be the length in inches of this new piece of pipe?

A.  $28\frac{7}{16}$

B.  $30\frac{9}{16}$

C.  $29\frac{1}{4}$

D.  $28\frac{11}{16}$

2. Fred works for Davis Tool as a truck driver. His delivery route is tabulated each day. Last Friday he drove  $10\frac{1}{2}$  miles for his first stop,  $14\frac{6}{10}$  miles for the second stop, and  $1\frac{3}{10}$  of a mile for the third stop. How many miles did he drive all together?

A.  $25\frac{1}{2}$

B.  $26\frac{7}{10}$

C.  $26\frac{2}{5}$

D.  $26\frac{1}{2}$

3. The following Friday Fred drove the same amount of miles (see problem 2) but he took the truck to the garage at the end of the day. The garage was  $6\frac{1}{5}$  miles from his last stop on that day. How far did he have to drive?

A.  $31\frac{2}{5}$

B.  $33\frac{4}{5}$

C.  $32\frac{3}{5}$

D.  $32\frac{1}{5}$

4. The factory needed new security fencing around the plant. The land around the factory measured  $3\frac{7}{10}$  miles on each of its four sides. How many miles of security fencing is needed to replace the old fencing?

- A.  $14\frac{1}{5}$  miles of fencing
- B.  $13\frac{8}{10}$  miles of fencing
- C.  $12\frac{3}{10}$  miles of fencing
- D.  $14\frac{8}{10}$  miles of fencing

5. The value of Davis stock went from  $19\frac{3}{8}$  to  $21\frac{1}{4}$  between June 1 and June 30. How many points in value did the stock change during the month of June?

- A.  $\frac{7}{8}$
- B.  $1\frac{1}{4}$
- C.  $1\frac{3}{8}$
- D.  $1\frac{7}{8}$

6. New rods for the welding machine had to be cut. One rod measured  $10\frac{5}{16}$  and the other rod measured  $5\frac{7}{8}$ . What is the difference in length between the two rods?

- A.  $4\frac{7}{16}$
- B.  $5\frac{7}{16}$
- C.  $4\frac{3}{16}$
- D.  $5\frac{3}{16}$

7. The factory classroom needed to be painted. Tim mixed  $\frac{5}{6}$  of a pint of thinner in each gallon of paint he used. How many pints of thinner did Tim use to complete the job that requires 24 gallons of paint?

- A. 18 pints
- B. 20 pints
- C.  $18\frac{5}{6}$  pints
- D. 22 pints

8. The hilo-driver clocks the distance traveled each day. He works 8 hours and drives  $31\frac{7}{10}$  miles each day. How many miles does he drive each 5 day week?

- A. 158 miles
- B.  $160\frac{7}{10}$  miles
- C. 159 miles
- D.  $125\frac{5}{7}$  miles

9. If an oil drip pan weighed  $10\frac{1}{2}$  pounds how many could you cut from an 840 pounds of steel ( do not be concerned about scrap pieces) ?

- A. 91 drip pans
- B. 80 drip pans
- C. 84 drip pans
- D. 108 drip pans

10. If one box holds 14 machine brackets, how many boxes are needed to pack 430 machine brackets ?

- A. 30 boxes
- B. 42 boxes
- C. 31 boxes
- D. 45 boxes

## Math Operations With Decimals

Add the following:

1.  $6.1 + 2.5 + 4.6 =$

2.  $634.1 + 4.1 + 796.1 =$

3.  $.614 + 3 + 2.8 + 743.1 =$

4.  $26 + 7.1 + 5 + 0071 =$

5.  $6.73 + 4 + .0006 =$

**Subtract the following decimals:**

1.  $6.71 - .50 =$

2.  $38.7 - 2.2 =$

3.  $47.6 - .40 =$

4.  $3.7010 - .9624 =$

5.  $64.7121 - .00375 =$

6.  $1267.83 - 94632 =$

**Multiply the following decimals:**

1. 
$$\begin{array}{r} 3.7 \\ \times 67 \\ \hline \end{array}$$

2. 
$$\begin{array}{r} .36 \\ \times 2.6 \\ \hline \end{array}$$

3. 
$$\begin{array}{r} .71 \\ \times 86 \\ \hline \end{array}$$

4. 
$$\begin{array}{r} .893 \\ \times .001 \\ \hline \end{array}$$

5. 
$$\begin{array}{r} 783 \\ \times .023 \\ \hline \end{array}$$

6. 
$$\begin{array}{r} .471 \\ \times .001 \\ \hline \end{array}$$

**Divide the following decimals:**

7.  $6.9 \div 2.3 =$

8.  $32.43 \div .47 =$

9.  $.3132 \div .36 =$

10.  $84 \div .00021 =$

### Math operations using decimals

1. A crate manufacturer uses wood that is 2.5 mm thick. To save money he plans to use wood that is 1.75 mm thick. How much thinner will the new wood be?
2. A worn floor at the plant must be covered with 1.5 inch plywood and another layer of .75 inch fiberboard. What is the thickness of the new flooring?
3. The odometer on Chris's car showed that one route to work was 7.7 miles round trip. Another route was 8.3 miles round trip. What is the difference in miles between routes for a 5 day work week?
4. A sign on a truck delivery door says, "Height limit = 11.5 feet." Sam's truck measures 11.2 feet tall when the tires are low. When the tires are full the truck is another 0.3 feet higher. Does Sam's truck clear the doorway when the tires are full?
5. By how much does Sam's truck clear the doorway when the tires are low?
6. Terry drove for 2.5 hours at an overage speed of 70 mph and for 1.5 hours at an average speed of 50 miles an hour. What is the total of the miles driven?

## Rounding decimals

To round a decimal is to shorten it or make it easier to read. This is done by discarding the digits (numbers) that are not needed.

Example 1: Eric earns \$7.68 for each hour of overtime he works. How much will he earn in 2.4 hours of overtime on Saturday?

**Step 1:** Solve the problem

\$7.68

x 2.4

3072

1536

\$18.432 Note that there are 3 decimal places in the answer.

**Step 2:** To write \$18.432 as dollars and cents, we want to keep only 2 digits (numbers) to the right of the decimal point. Because 2 is less than 5, we drop the number and leave the answer as 43 cents.

If the number was 5 or more, you would drop the number and raise the digit to the left by one.

Example: \$18.466 would be rounded to \$18.47.

## Practice rounding decimals:

1. Round to the nearest tenth:

0.32 \_\_\_\_\_ 0.67 \_\_\_\_\_ 0.65 \_\_\_\_\_ 0.81 \_\_\_\_\_  
0.94 \_\_\_\_\_ 0.58 \_\_\_\_\_ 0.76 \_\_\_\_\_ 0.59 \_\_\_\_\_

2. Round to the nearest one hundredth:

0.321 \_\_\_\_\_ 0.679 \_\_\_\_\_ 0.652 \_\_\_\_\_ 0.818 \_\_\_\_\_  
0.943 \_\_\_\_\_ 0.587 \_\_\_\_\_ 0.764 \_\_\_\_\_ 0.595 \_\_\_\_\_

3. Round to the nearest thousandth:

0.32191 \_\_\_\_\_ 0.67982 \_\_\_\_\_ 0.65237 \_\_\_\_\_  
0.81862 \_\_\_\_\_ 0.94344 \_\_\_\_\_ 0.58799 \_\_\_\_\_  
0.76469 \_\_\_\_\_ 0.59527 \_\_\_\_\_ 1.38585 \_\_\_\_\_

4. Round to the nearest ten thousandth:

0.32191 \_\_\_\_\_ 0.67982 \_\_\_\_\_ 0.65237 \_\_\_\_\_  
0.81862 \_\_\_\_\_ 0.94344 \_\_\_\_\_ 0.58799 \_\_\_\_\_  
0.76469 \_\_\_\_\_ 0.59527 \_\_\_\_\_ 1.38585 \_\_\_\_\_

**Write each fraction as a decimal.**

1.  $\frac{1}{10} =$  \_\_\_\_\_

2.  $\frac{1}{100} =$  \_\_\_\_\_

3.  $\frac{1}{1000} =$  \_\_\_\_\_

4.  $\frac{1}{10,000} =$  \_\_\_\_\_

5.  $\frac{1}{100,000} =$  \_\_\_\_\_

**Write each decimal as a fraction.**

6. .7 \_\_\_\_\_

7. .07 \_\_\_\_\_

8. .007 \_\_\_\_\_

9. .0007 \_\_\_\_\_

10. .00007 \_\_\_\_\_

11. .000007 \_\_\_\_\_

Write each fraction as a decimal.

12.  $\frac{23}{100} =$  \_\_\_\_\_

13.  $\frac{8}{10} =$  \_\_\_\_\_

14.  $\frac{7}{10,000} =$  \_\_\_\_\_

15.  $\frac{475}{10,000} =$  \_\_\_\_\_

16.  $\frac{32}{100} =$  \_\_\_\_\_

17.  $\frac{6750}{10,000} =$  \_\_\_\_\_

18.  $\frac{3}{10,000} =$  \_\_\_\_\_

19.  $\frac{4}{1000} =$  \_\_\_\_\_

20.  $\frac{6}{10,000} =$  \_\_\_\_\_

21.  $\frac{95}{1000} =$  \_\_\_\_\_

22.  $\frac{787}{10,000} =$  \_\_\_\_\_

23.  $\frac{65}{100,000} =$  \_\_\_\_\_

24.  $\frac{2}{100,000} =$  \_\_\_\_\_

**Add the following decimals:**

1. 
$$\begin{array}{r} 6.80 \\ +.02 \\ \hline \end{array}$$

2. 
$$\begin{array}{r} 3.4 \\ + 1.7 \\ \hline \end{array}$$

3. 
$$\begin{array}{r} 2.06 \\ + 1.1 \\ \hline \end{array}$$

4. 
$$\begin{array}{r} 4.7 \\ .01 \\ .002 \\ + 3.0 \\ \hline \end{array}$$

5. 
$$\begin{array}{r} 8.71 \\ .121 \\ + 1.60 \\ \hline \end{array}$$

6.  $3.1 + 2.8 + 4.3 =$

7.  $2.6 + 4 + .0072 =$

8.  $4.062 + 2.2 + .007 =$

9.  $.386 + .002 + .5463 =$

10.  $916.3 + 20.6 + .066 =$

11.  $4.7 + 1.96 + .001 =$

12.  $.006 + .00046 + 2.2 =$

**Subtract the following decimals**

1.  $9.6 - .002 =$

2.  $4.76 - 1.25 =$

3.  $15.6 - 3/3 =$

4.  $106.78 - 9.9 =$

5.  $387.1 - 132.26 =$

6.  $.0934 - .0012 =$

7.  $.00065 - .000347 =$

8.  $967.95 - 2.56 =$

9.  $.0073 - .0028 =$

10.  $.0006 - .00059 =$

**Multiply the following decimals:**

1.  $\begin{array}{r} 8.1 \\ \times 2.5 \\ \hline \end{array}$

2.  $\begin{array}{r} 2.6 \\ \times 1.7 \\ \hline \end{array}$

3.  $\begin{array}{r} 11.9 \\ \times .03 \\ \hline \end{array}$

4.  $1.78 \times .21 =$

5.  $.003 \times .02 =$

6.  $175.1 \times .00001 =$

7.  $93.1 \times 10 =$

8.  $33.6 \times .002 =$

9.  $.0171 \times .363 =$

10.  $.00063 \times .0027 =$

**Divide the following decimals:**

1.  $.06 \div 2 =$

2.  $6 \div .02 =$

3.  $.06 \div .02 =$

4.  $3.60 \div .06 =$

5.  $.360 \div .006 =$

6.  $19.88 \div .28 =$

7.  $2.346 \div 5.1 =$

8.  $3600 \div .0009 =$

9.  $2.139 \div 2.3 =$

10.  $74.8 \div .44 =$

Change the following fractions to decimals and to percents:

1.  $\frac{1}{2} =$  .50 50%

2.  $\frac{1}{4} =$  \_\_\_\_\_

3.  $\frac{1}{5} =$  \_\_\_\_\_

4.  $\frac{1}{8} =$  \_\_\_\_\_

5.  $\frac{2}{5} =$  \_\_\_\_\_

6.  $\frac{5}{8} =$  \_\_\_\_\_

7.  $\frac{9}{10} =$  \_\_\_\_\_

8.  $\frac{7}{12} =$  \_\_\_\_\_

9.  $\frac{7}{8} =$  \_\_\_\_\_

10.  $\frac{1}{3} =$

\_\_\_\_\_

\_\_\_\_\_

11.  $\frac{2}{3} =$

\_\_\_\_\_

\_\_\_\_\_

12.  $\frac{1}{6} =$

\_\_\_\_\_

\_\_\_\_\_

13.  $\frac{4}{5} =$

\_\_\_\_\_

\_\_\_\_\_

14.  $\frac{3}{16} =$

\_\_\_\_\_

\_\_\_\_\_

15.  $\frac{9}{20} =$

\_\_\_\_\_

\_\_\_\_\_

16.  $\frac{4}{25} =$

\_\_\_\_\_

\_\_\_\_\_

17.  $\frac{7}{25} =$

\_\_\_\_\_

\_\_\_\_\_

18.  $\frac{17}{20} =$

\_\_\_\_\_

\_\_\_\_\_

**Change to a fraction in lowest terms and a percent.**

- |     |      |                                               |            |
|-----|------|-----------------------------------------------|------------|
| 1.  | .40  | $\frac{40}{100} = \frac{4}{10} = \frac{2}{5}$ | <u>40%</u> |
| 2.  | .60  | _____                                         | _____      |
| 3.  | .5   | _____                                         | _____      |
| 4.  | .65  | _____                                         | _____      |
| 5.  | .065 | _____                                         | _____      |
| 6.  | .8   | _____                                         | _____      |
| 7.  | .28  | _____                                         | _____      |
| 8.  | .12  | _____                                         | _____      |
| 9.  | .012 | _____                                         | _____      |
| 10. | .783 | _____                                         | _____      |

**Find the percentage of the following whole numbers:**

1. 5% of 100 = \_\_\_\_\_

2. 10% of 80 = \_\_\_\_\_

3. 16% of 80 = \_\_\_\_\_

4. 35% of 95 = \_\_\_\_\_

5. 30% of 600 = \_\_\_\_\_

6. 75% of 400 = \_\_\_\_\_

7. 60% of 36 = \_\_\_\_\_

8. 28% of 56 = \_\_\_\_\_

9. 19% of 400 = \_\_\_\_\_

10.  $66\frac{2}{3}\%$  of 300 = \_\_\_\_\_

## Rules for working with Positive and Negative Numbers

**Addition Rule 1:** To add two or more numbers with the same sign, add the numbers and give the answers the same sign.

Example: The X Company lost \$50,000 in sales in May and \$10,000 in sales in June. What was the total loss for May and June?

$$\begin{array}{r} -\$50,000 \\ + -\$10,000 \\ \hline -\$60,000 \end{array}$$

**Addition Rule 2:** To add numbers with different signs, find the difference between the numbers. Then give the answer the sign of the larger number.

Example: Yesterday morning at 6 AM the temperature was 10 degrees below zero. By noon, the temperature at risen 12 degrees. What was the temperature at noon?

$$\begin{array}{r} -10 \\ +12 \\ \hline +2 \end{array}$$

**Subtraction Rule:** Change the sign of the "take away" number (the second number in the problem), and follow the rules for addition.

Example: The temperature at noon was -3 degrees. It was -18 degrees at midnight. What was the difference between the noon and the midnight temperature?

First write the problem.

$$\begin{array}{r} -3 \\ - -18 \\ \hline \end{array}$$

Change the subtraction sign to an addition sign. Also change the number after the subtraction sign to the opposite sign.

$$\begin{array}{r} -3 \\ + +18 \\ \hline 15 \text{ degrees difference} \end{array}$$

**Add or subtract the following positive and negative numbers:**

1.  $+5 + (-1) =$

2.  $-12 + (-31) =$

3.  $+14 + (-8) =$

4.  $-10 - (+3) =$

5.  $-3 - (-8) =$

6.  $+9 - (+6) =$

7.  $+16 - (-11) =$

8.  $+6 - (-17) =$

9.  $0 - (-2) =$

### Rule for Adding 3 or more Signed Numbers

To add 3 or more signed numbers, add the positive numbers. Add the negative numbers. Then add the two totals and give the answer the sign of the largest number.

Example:  $9 + (-10) + (-4) + 3 =$

Add the positive numbers  $9 + 3 = 12$

Add the negative numbers  $-10 + (-4) = -14$

Add the totals together  $12 + (-14) = -2$

1.  $-8 + (-2) + 6 =$

2.  $4 + (-1) + (-3) =$

3.  $-6 + 4 + (-10) =$

4.  $12 + (-7) + (-7) =$

5.  $-22 + (-4) + 3 + 9 =$

6.  $40 + (-10) + (-20) + 10 =$

7.  $16 + (-25) + 25 + (-16) =$

8.  $-20 + (-19) + (-14) + 8 =$

9.  $49 + (-54) + 6 + 9 =$

10.  $-22 + (-8) + (-7) + 32 =$

## Multiplication & Division Rules for Positive & Negative Numbers

**Multiplication and Division Rule 1:** When you multiply or divide numbers with the **same** sign, give the answer a POSITIVE (+) sign.

Example  $-6 \times -3 = +18$

$$+6 \times +3 = +18$$

$$-10 \div -2 = +5$$

$$+10 \div +2 = +5$$

### Multiplication and Division Rule 2:

When you multiply or divide numbers with **different** signs, give the answer a NEGATIVE (-) sign.

Example:  $-5 \times +8 = -40$

$$-24 \div +3 = -8$$

$$+24 \div -3 = -8$$

**Practice multiplying or dividing the following:**

1.  $(-2)(3) =$

2.  $-5(4) =$

3.  $-9(0) =$

4.  $-7(2) =$

5.  $(4)(-25) =$

6.  $-21 \div -3 =$

7.  $12 \div 6 =$

8.  $-18 \div -3 =$

9.  $-27 \div 9 =$

10.  $-14 \div -7 =$

11.  $70 \div 10 =$

12.  $-81 \div 9 =$

13.  $-45 \div -9 =$

14.  $-16 \div 2 =$

15.  $100 \div -25 =$

16.  $-28 \div -7 =$

### Finding the Average or Mean:

The **average** or **mean** is a good measure to describe the middle amount of a set of data. To find the **average** or **mean**, divide the total by the number of parts.

**Example:** The East production line produced 100 flywheels during the first shift, 154 during the second shift, and 162 during the third shift. What was the average production for the East line that day?

$$\begin{array}{r} 100 \\ 154 \\ + \underline{160} \\ \hline 414 \end{array}$$

$414 \div 3 = 138$  Next, divide the total by the number of sets of data. In this case, the total is divided by 3, since there were 3 shifts that produced data.

**Practive finding the average:**

1. Tim's production of oil pans for the week was:

Monday 98

Tuesday 101

Wednesday 142

Thursday 158

Friday 139

What was his average for the week?

2. On her delivery route, Debbie used 8 gallons of gas on Monday,  
10 gallons of gas on Tuesday,  
9 gallons of gas on Wednesday,  
14 gallons of gas on Thursday,  
and 8 gallons of gas on Friday.

What was the average amount of gas used daily?

3. The Advise Company had sales of \$103 million in 1990, \$142 million in 1991, \$98 million in 1992, \$112 million in 1993, \$138 million in 1994, and \$156 million in 1995.

What is their average sales from 1990 to 1995?

What is their average sales from 1990 to 1992?

What is their average sales from 1993 to 1995?

## Word List for SPC-Prep 1

Space has been left after each letter to add words that are helpful to you.

**abbreviation:** a short way of writing something. The abbreviation for Quality Control is QC.

**average** - the average of a set of numbers is found by adding a set numbers together and dividing by the amount of numbers that make up the sum.

Ex.  $12 + 14 + 15 + 19 = 60$                        $60 \div 4 = 15$

**axes** - the plural of *axis*, more than one axis

**axis** -- the line on a graph, there are usually 2 axes, one horizontal (left to right) and one vertical (up and down)

**bar graph** -- a graph that uses bars (stripes or bands) to picture the relationships among numbers. Bar graphs show data based on a vertical axis and a horizontal axis in the form of bars. They are very good for comparing information.

basic operations

**basic math signs and operations** -

- + addition or positive number
- subtraction or negative number
- x multiplication or unknown number
- / division
- $\div$  division
- > greater than
- < less than

**canceling-** a shortcut when multiplying fractions. It means dividing a top and a bottom number by a figure that goes evenly into both before actually multiplying. It is not necessary to cancel to get the right answer, but it makes multiplying easier.

**chart** -- a graphic representation of data that lists exact numbers in columns and rows  
common denominator

**chart** -- a graphic representation of data that lists exact numbers in columns and rows

**column** -- a group of numbers or words that are listed vertically, (up and down) in a table or chart

**convert** - change, Ex. *convert* a fraction to a decimal means to change a fraction to a decimal

**communication** -- the process of sending a message through selected channels to a receiver and then getting feedback to check for mutual understanding.

**communication skills** -- The way we give information to others and receive information from others. Reading, writing, speaking, and listening are communication skills.

**compare** -- to look at two or more numbers and see their similarities and differences; also to decide which is larger or smaller.

**convert** -- to change one thing to another. Sometimes it's necessary to convert meters to yards.

**decimal**

**decimal point** - a dot written in a series of numbers that has the places of whole numbers to the left of it and decimal places to the right of it.

**denominator** - the bottom number of a fraction, it tells how many parts are in the whole

**digit**

**dimensions** -- the length, width, and/or depth of an object. The dimensions of the sheet of steel were: length, 10 feet; width, 5 feet

**divisible number**

**equal** - being the same or identical to in value

**fraction** -- a part of a whole, a number less than one but greater than zero

Ex.  $\frac{1}{4}$

- **graphs** - a picture or map of numbers, tools for displaying data. There are many different kinds of graphs including bar graphs, line graphs, and pie charts or circle graphs.

**higher terms** - to change a fraction to larger numbers so you can continue with adding, subtracting, multiplying and dividing.  $\frac{1}{5}$  can be raised to  $\frac{2}{10}$  or  $\frac{20}{100}$

**improper fraction** - the top number is *equal to or larger than* the bottom number.

**intersect** -- to meet and cross at a point, in a chart or table

**invert** - means to turn a fraction upside down.  $\frac{7}{10}$  can be inverted to  $\frac{10}{7}$

**lowest terms** - to change a fraction to the lowest numbers possible.  $\frac{2}{8}$  can be reduced to the lowest terms of  $\frac{1}{4}$ .

**math operations** - are addition, subtraction, multiplication, and division

**mean** - the average of a set of numbers, calculated by adding a set numbers together and dividing by the number of sets in the sum. Ex.  $12 + 14 + 15 + 19 = 60$        $60 \div 4 = 15$

**metric system** -- a system of measurement based on tens, used by most people outside the United States. Units such as centimeters, millimeters, grams, and kilograms are used in the metric system

**minus sign ( - )** - The sign for subtraction or a negative number

**mixed numbers** - a whole number written next to a proper fraction,  $3\frac{1}{3}$ . To perform math operations to some mixed numbers, they must be changed to improper fractions.

$3\frac{1}{3}$  is changed to  $\frac{10}{3}$ .

**multiplication sign ( x )** - the sign for multiplication.

**negative number** - a number less than zero

**numerator** - the upper number of a fraction, it tells how many parts you have

**proper fraction** the top number is less than the bottom number --  $\frac{1}{3}$

**plus sign ( + )** - the sign for addition or a positive number

**positive number** - a number greater than zero

**reduce** (a fraction) - means writing it with smaller numbers.  $\frac{25}{100}$  can be reduced to  $\frac{1}{4}$

**relationship** -- a connection between people or things. Graphs and charts show the relationships of numbers

**rounding off** -

**SPC** -- Statistical Process Control is a method companies use to achieve quality; a method of gathering and analyzing data to solve practical quality problems. Controlling the process with statistical methods to guide in the outcome of quality products or partswwhole numbers

**statistics** -- summaries of data; the science of collecting, organizing, and analyzing data to draw conclusions

**table** -- a graphic representation of data that lists exact numbers in columns and rows

**technology** -- Machines and ways of doing things that improve the speed and/or quality of work. The use of computers in manufacturing is an example of modern technology.

**U. S. customary units** -- the way people in the United States usually measure, using units such as inches, feet, miles, ounces, and pounds. In many industries, U. S. customary units are being replaced by the metric system.

**whole numbers** - the numbers most commonly used in counting (0, 1, 2, 3, 4, . . .)

**width** -- the distance from one side to another of something. In rectangles, the shorter dimension. The length of the rectangle was 50 centimeters, the width was 20 centimeters

**x** - the sign for multiplication. Can also stand for an unknown number.

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### Answer Key

p. 4: 1. 79 2. 193 3. 287 4. 283 5. 286 6. 1790 7. 1780 8. 1488  
9. 1570 10. 32,168 11. 258,871

p. 5: 1. 33 2. 591 3. 3,892 4. 4,587 5. 19,481 6. 38,812 7. 34,530  
8. 40,589 9. 9,801

p. 6: 1. 320 2. 2,772 3. 8,811 4. 288,422 5. 5,285,280 6. 2,144,813  
7. 1,402,000 8. 4,095,793 9. 1,000,000

p. 7: 1. 3 2. 3 3. 20 4. 578 5. 56 6. 792 7. 29 R30 8. 261 R8

p. 8: 1. 80; 50; 50; 30; 990; 820; 900; 430; 910  
2. 3,100; 6,600; 62,900; 8,600; 8,500; 45,200  
3. 24,000; 65,000; 398,000; 68,000; 41,000; 994,000  
4. 120,000; 460,000; 1,980,000; 790,000; 500,000; 3,930,000  
5. 500,000; 109,500,000; 8,400,000; 986,400,000; 4,800,000; 843,400,000  
6. 124,000,000; 165,000,000; 975,000,000; 171,000,000

p. 10: 1. c 8 2. c 11 3. a 7 4. d None 5. b 6. b 6 7. c 8 8. b 2

p. 11: 1.  $\frac{5}{12}$  2.  $\frac{57}{100}$  3.  $\frac{9}{16}$  4.  $\frac{7}{12}$  5.  $\frac{5}{7}$  6.  $\frac{72}{298}$  or  $\frac{36}{149}$

p. 13: 1. 2 2. 4 3. 4 4. 12 5. 8

p. 14: 1.  $\frac{2}{2}=1$  2.  $\frac{3}{3}=1$  3.  $\frac{2}{5}$  4.  $\frac{5}{9}$  5.  $\frac{4}{8} = \frac{1}{2}$  6.  $3\frac{2}{7}$  7.  $4\frac{2}{4} = 4\frac{1}{2}$   
8.  $5\frac{3}{11}$  9.  $11\frac{9}{15} = 11\frac{3}{5}$  10.  $4\frac{2}{4} = 4\frac{1}{2}$  11.  $5\frac{4}{8} = 5\frac{1}{2}$  12.  $8\frac{2}{14} = 8\frac{1}{7}$

13.  $23\frac{12}{8} = 24\frac{1}{2}$  14.  $6\frac{7}{5} = 7\frac{2}{5}$  15.  $9\frac{8}{8} = 10$  16.  $17\frac{13}{8} = 18\frac{5}{8}$

p. 15: 1. 4 2. 9 3. 12 4. 18 5. 10 6. 12 7. 20 8. 63 9. 18 10. 60

p. 16: 1.  $8\frac{5}{6}$  2.  $3\frac{3}{8}$  3.  $10\frac{5}{12}$  4.  $10\frac{3}{10}$  5.  $8\frac{7}{24}$  6.  $9\frac{3}{4}$  7.  $20\frac{2}{3}$  8.  $26\frac{16}{21}$   
9.  $26\frac{7}{10}$  10.  $29\frac{11}{24}$  11.  $32\frac{19}{40}$  12.  $34\frac{9}{10}$  13.  $26\frac{8}{15}$  14.  $47\frac{16}{63}$  15. 5  
16.  $23\frac{33}{42}$

p. 17: 1.  $1\frac{3}{4}$  2.  $2\frac{1}{3}$  3.  $\frac{5}{9}$  4.  $1\frac{5}{7}$  5.  $5\frac{2}{3}$  6.  $\frac{5}{7}$  7.  $\frac{19}{25}$  8.  $3\frac{6}{7}$  9.  $5\frac{11}{48}$   
10.  $13\frac{3}{4}$  11.  $30\frac{8}{9}$  12.  $4\frac{63}{64}$  13.  $6\frac{1}{4}$  14.  $4\frac{3}{4}$  15.  $1\frac{7}{8}$

p. 18: 1.  $2\frac{1}{5}$  2.  $3\frac{1}{3}$  3. 7 4.  $4\frac{2}{3}$  5.  $7\frac{7}{10}$  6.  $8\frac{7}{12}$  7.  $3\frac{13}{24}$  8.  $11\frac{1}{5}$   
9.  $5\frac{5}{6}$  10.  $10\frac{9}{10}$  11.  $127\frac{7}{15}$  12.  $35\frac{21}{32}$

p. 19: 1.  $\frac{1}{4}$  2.  $\frac{1}{16}$  3.  $\frac{4}{30} = \frac{2}{15}$  4.  $\frac{2}{25}$  5.  $\frac{28}{50} = \frac{14}{25}$  6.  $\frac{6}{40} = \frac{3}{20}$   
7.  $\frac{24}{50} = \frac{12}{25}$  8.  $\frac{48}{168} = \frac{2}{7}$  9.  $\frac{15}{240} = \frac{1}{16}$  10.  $\frac{12}{75} = \frac{4}{25}$

p. 20: 1.  $2\frac{1}{4}$  2.  $3\frac{2}{3}$  3. 6 4. 12 5. 8 6. 12 7.  $3\frac{1}{28}$  8. 12 9.  $3\frac{1}{2}$   
10. 2

p. 21: 1. 1 2. 1 3.  $1\frac{1}{8}$  4.  $\frac{3}{4}$  5.  $1\frac{11}{24}$  6.  $1\frac{3}{4}$  7.  $1\frac{5}{16}$  8.  $1\frac{1}{2}$

p. 22-24: 1. b  $30\frac{9}{16}$  2. c  $26\frac{2}{5}$  3. c.  $32\frac{3}{5}$  4. a  $14\frac{1}{5}$  miles of fencing

5. d  $1\frac{7}{8}$  6. a  $4\frac{7}{16}$  7. b 20 pints 8.  $125\frac{5}{7}$  miles 9. 80 drip pans  
10. 31 boxes

p.25: 1. 13.2 2. 1.434.3 3. 749.514 4. 38.1071 5. 10.7306

p. 26: 1. 6.21 2. 36.5 3. 47.2 4. 2.7386 5. 64.70835 6. 1,173.198

p. 27: 1. 247.9 2. 93.6 3. 61.06 4. .000893 5. 18.009 6. .000471  
7. 3 8. 69 9. .87 10. 400,000

p. 28: 1. .75 mm thinner 2. 2.25 inches thick 3. 3 miles  
difference 4. No, the truck measures 11.5 feet. 5. The truck  
clears the door by .03 feet. 6. 250 miles

p. 30: 1. .3; .7; .7; .8; .9; .6; .8; .6

2. .32; .68; .65; .82; .94; .59; .76; .60

3. .322; .680; .652; .819; .943; .588; .765; .595; 1.386

4. .3219; .6798; .6524; .8186; .9434; .5880; .7647; .5953;  
1.3859

p. 31: 1. .1 2. .01 3. .001 4. .0001 5. 00001 6. 7/10

7. 7/100 8. 7/1000 9. 7/10,000 10. 7/100,000

11. 7/1,000,000

p. 32: 12. .23 13. .8 14. .0007 15. .0475 16. .32

17. .6750 18. .0003 19. .0004 20. .0066 21. .095

22. .0787 23. .00065 24. .00002

p. 33: 1. 6.82 2. 5.1 3. 3.16 4. 7.712 5. 10.431 6. 10.2

7. 6.6072 8. 6.269 9. .9343 10. 936.966 11. 6.661

12. 2.20646

**p. 34:** 1. 9.598 2. 3.51 3. 12.3 4. 96.88 5. 254.84  
6. .0922 7. .000303 8. 965.39 9. .0045 10. .00001

**p. 35:** 1. 20.25 2. 4.42 3. .357 4. .3738 5. .00006  
6. .001751 7. 931 8. .0672 9. .0062073 10. .0000017

**p. 36:** 1. .03 2. 300 3. 3 4. 60 5. 60 6. 71 7. .46  
8. 4,000,000 9. .93 10. 170

**p. 37-38:** 2. .25 25% 3. .20 20% 4. .125 12.5% 5. .40 40%  
6. .625 62.5% 7. .90 90% 8. .58333 58.3% 9. .875 87.5%  
10. .333 33.3% 11. .666 66.6% 12. .1666 16.6%  
13. .80 80% 14. .1875 18.75% 15. .45 45% 16. .16 16%  
17. .28 28% 18. .85 85%

**p. 39:** 2.  $\frac{3}{5}$  60% 3.  $\frac{1}{2}$  50% 4.  $\frac{13}{20}$  65% 5.  $\frac{13}{200}$  6.5%  
6.  $\frac{4}{5}$  80% 7.  $\frac{7}{25}$  28% 8.  $\frac{3}{25}$  12% 9.  $\frac{3}{250}$  1.2%  
10.  $\frac{783}{1000}$  78.3%

**p. 40:** 1. 5 2. 8 3. 12.8 4. 33.25 5. 180 6. 300 7. 21.6  
8. 15.68 9. 76 10. 200

**p. 42:** 1. +4 2. -43 3. +6 4. -7 5. +5 6. +3 7. +27

8. +23 9. 0

p. 43: 1. -4 2. 0 3. -12 4. -2 5. -14 6. +20 7. 0 8. -45  
9. +10 10. -5

p. 45: 1. -6 2. -20 3. 0 4. -14 5. -100 6. +7 7. +2 8. +6  
9. -3 10. +2 11. +7 12. -9 13. +5 14. -8 15. -4 16. +4

p. 47: 1. 127.6 2.  $9\frac{4}{5}$  gal. 3.  $\$124.8\frac{1}{3}$  million  $\$114\frac{1}{3}$  million  
 $\$135\frac{1}{3}$  million